INTRODUCTION

Athletes continually push the limits of human performance in their zest with quest to be the best. Training, competition demands, balancing sports and studies, other sports related worries and other non sporting commitments form a great source of stress among student athletes. Women in sports experience stressors that are unique to gender orientation, along with the competitive stressors experienced by athletes in general. Some learn to cope with these situations successfully, while others who are unable, find sports participation stressful and threatening. The demanding situations in a female student athlete's life may result in increased anxiety, formation of negative mood states impeding optimal performance, injury and even 'drop outs' in sports. Thus there is need to enable them to regulate their emotions and help them to continue to enjoy the rich benefits of participating in competitive sports and empower them to lead an improved quality life recognizing the importance sports participation has in the empowerment of women and girls. The realization is dwelling more and more that the wining edge in sports is just not the physical dominance but rather a combination of psychological, physiological and technical factors.

All athletes, irrespective of being elite or less skilled, is found to experience anxiety and perceive it to be detrimental to performance on account of the negative views most individuals hold on this concept. Athletes participating in competitive sports report anxiety to be one of the most critical aspects of sport competitor's mental state. Psychological variables that are likely to affect athletic performance include mood states besides anxiety.

Several conceptual frameworks have been advanced to address the stress/performance relationship. The first theories or models that emerged to explain anxiety and its effect on performance – drive theory, inverted-U hypothesis, and zone of optimal functioning – posited anxiety to be one-dimensional. Gradually cognitive anxiety and somatic anxiety began to be recognized as the subcomponents of anxiety with the introduction of multidimensional theories. Cognitive anxiety was characterized as the negative

concerns and somatic anxiety as the subjective interpretation of physical manifestations of anxiety. Theories based on anxiety intensity, generally predicted that cognitive state anxiety intensity is negatively related to performance, and that somatic state anxiety intensity forms an inverted-U relationship with performance. Contradictory results testing the hypothesis of these theories lead to the development of directional concept of anxiety. The cusp catastrophe model of anxiety and the processing efficiency theory (PET) have addressed the debilitating and facilitating effects of anxiety. Gradually the notion that interpretation of anxiety and not intensity of anxiety have an impact on their performance gained acceptance.

The mental health model put forth by Morgan (1985) was the premier model that attempted to explain mood performance relationship. Further Lane and Terry (2000) developed conceptual model as an attempt to lend meaning to the contradictory results on the mental health model.

The tendency to regulate mood may be nurtured by the natural processes. There is need to find if athletes could be trained to regulate their mood states, given the importance pre competition mood states have on performance. Many cognitive and somatic strategies have been developed over the years as a result of the search for assisting athletes in regulating the anxiety symptoms concerning sports competition. Among them mental imagery, relaxation techniques and cognitive restructuring have been the most commonly used psychological training skills. The present study is an attempt to find the efficacy of autogenic training, breathing techniques (Pranayama), progressive muscle relaxation and imagery (paradoxical imagery) in regulating pre- competitive anxiety and mood states.

STATEMENT OF THE PROBLEM

The purpose of the study was to evaluate the effect of cognitive and somatic strategies on psycho physiological parameters of female athletes.

LIMITATIONS

1. Idiosyncrasy influencing the results of the study may be considered as a limitation.
2. Difficulty in maintaining control group *per se*. With the intention of bringing homogeneity among the subjects of the study, athletes of the same team residing in the same hostel were randomly assigned to control group and other intervention groups. Co existence may have influenced the control group.

DELIMITATIONS

1. The study was delimited to female college athletes of three colleges in Thrissur district.
2. The study was delimited to the following intervention strategies:
   - (i) Progressive muscle relaxation (PMR)
   - (ii) Breathing techniques (pranayama)
   - (iii) Autogenic Training
   - (iv) Mental imagery (Paradoxical imagery)
3. The experimental period for the study was delimited to twelve weeks.
4. The study was delimited to the assessment of the following variables:
   - (i) Competitive state anxiety
   - (ii) Mood states
   - (iii) Heart rate
   - (iv) Blood pressure
   - (v) Breath rate
   - (vi) Trait anxiety
   - (vii) Performance measures

HYPOTHESES

Hypothesis I

It was hypothesised that high levels of cognitive anxiety would not be detrimental to performance provided it interacts with low levels of somatic anxiety. High cognitive anxiety on the other hand will be debilitative to performance with similar intensity of somatic anxiety as posited in CUSP catastrophe model.

Hypothesis II

High self confidence will enhance facilitative interpretation of cognitive and somatic anxiety and performance.

Hypothesis III

Positive mood states will be favourable for optimum performance.

Hypothesis IV

Interventions would be effective in moderating cognitive anxiety, somatic anxiety, self confidence and interpretation of cognitive and somatic anxiety, similar to pre test optimum performance.

Hypothesis V

Intervention would be effective in reducing negative factors of mood state and increasing vigour.

Hypothesis VI

There would not be any differential effects on selected interventions on pre competitive anxiety and mood performance.

DEFINITION AND EXPLANATION OF THE TERMS

Athlete

The word athlete is derived from a Greek word meaning “prize” or “contest”. It is generally referred to a person trained to compete in sports or exercises involving physical strength, speed, or endurance or to a person who has a natural aptitude for physical activities. The term athlete is commonly used to

indicate a person involved in athletics, which involves track and field events, long distance, cross-country and road running, and race walking. The term athlete has been used in the present thesis to denote a person trained to compete in any type of sport.

Anxiety

Anxiety is the subjective feelings of apprehension marked by heightened physiological arousal (Levitt, 1980). It occurs when an individual doubts his or her ability to cope with the situation that causes him or her stress (Hardy et al., 1996). The definition of Hardy (1999) describing cognitive anxiety as "performers' concerns about performing well and the consequences of failing to do so" and somatic anxiety as 'performers' perceptions of their physiological response to psychological stress" has been accepted as the definition for the present thesis.

Pranayama

Pranayama is a Sanskrit word meaning "extension of the prana or breath". The process of controlling the breath is called Pranayama "Pranayama is the conscious, deliberate regulation of breath replacing unconscious patterns of breathing" (Yoga Sutra).

Progressive Muscular Relaxation (PMR)

Progressive muscle relaxation is a technique for reducing anxiety by alternately tensing and relaxing the muscles. It was developed by American physician Edmund Jacobson in the early 1920s. It entails minimising tension in the muscles that are required for some activity, whilst concurrently relaxing those muscles that are not necessary to the enactment of the skill (Jacobson, 1938). It originated from the theory that a psychobiological state called neuromuscular hypertension is the basis for a variety of negative emotional states and psychosomatic diseases (Jacobson, 1938).

Autogenic Training

Autogenic training is a psycho physiological form of psychotherapy using passive concentration and certain combinations of psycho physiologically adapted

stimuli (Kanji 1997). Heaviness and warmth, relaxed breathing and a cool forehead is elicited by mental repetition of brief verbal phrases directing attention to specific bodily areas to achieve a relaxed state (Sadock & Sadock, 2003).

Imagery

Imagery, in the context of sport, may be considered *"as the voluntary or involuntary creation or re-creation of an experience generated from memorial information, involving quasi sensorial, quasi-perceptional, and quasi-affective characteristics which may occur in the absence of the real stimulus antecedents normally associated with the actual experience and which may have physiological and psychological effects on the imager*" Modified version of Morris, Spittle, and Watt's (2005) definition by (Weibull, 2005, p. 1).

Paradoxical Imagery

Paradoxical imagery is based on Wegner's (1994) theory of ironic process which proposes that anxiety related symptoms may actually increase in the attempts to get rid of unwanted symptoms occurring through the workings of an unconscious monitoring process. Hence purposefully anticipating anxiety could potentially reduce possible ironic effects of the monitoring process. Psychological-skills/techniques that promote intentionally thinking about symptoms that are typically undesired (e.g., cognitive and/or somatic anxiety) are commonly referred to as paradoxical interventions (Wegner, 1997).

Cognitive strategies

A cognitive strategy is a mental routine or procedure for accomplishing a cognitive goal. Goals directed and *consciously* controllable process that facilitates performance may be termed as cognitive strategies. Visualization, verbalization, making associations and accessing cues, are some of the cognitive strategies.

Somatic strategies

Somatic relates to the body, especially the body as considered being separate from the mind. Interventions that are directed to deal with the physiological response to psychological stress may be termed as somatic strategies.

SIGNIFICANCE OF THE STUDY

The present study is an attempt to understand anxiety mood performance relationship and evaluate effectiveness of cognitive and somatic strategies in moderating pre competitive anxiety and mood states conducive to peak performance. The importance of psychological skill training is yet to be established among our sports fraternity. Athletic training in India in the present scenario continues to be limited to physical training. The detailed explanation of anxiety mood performance relationship of the subjects in the present study may provide useful information for psychological preparation of women athletes specific to Kerala state and women athletes in general.

1. The present study is one of the premier studies that have evaluated the interaction of pre competition anxiety and mood states in relation to athletic performance.
2. This study is also unique in nature that it has studied pre competition anxiety mood performance relationship combining previous optimum, previous dysfunctional performance and post intervention performances as referential medium.
3. Result of the study is valuable in understanding optimum anxiety and mood states for optimum athletic performance.
4. Results of the study will be helpful to adopt suitable interventions to enhance athletic performance.

SELECTION OF TESTS

The present study investigates the effect of interventions on pre competitive anxiety and mood state with relation to athletic performance. Initial data for grouping were collected with the help of demographic questionnaire. Trait anxiety was measured using Sport Competition Anxiety Test (SCAT). Cognitive anxiety, somatic anxiety, self confidence, interpretation of cognitive anxiety and interpretation of somatic anxiety were measured using Modified Competitive State Anxiety Inventory (CSAI-2 Martens, *et al.*, 1990; Jones and Swain, 1992). Mood states were evaluated with Brunel Mood Scale (BRUMS; Terry *et al.*, 1999).

Anxiety induced physiological arousal were assessed by measuring blood pressure, respiratory rate and heart rate. Performance was evaluated using measure of player performance questionnaire.

SELECTION OF SUBJECTS

Purposive sampling was adopted for selection of subjects. Three women's colleges of Thrissur district with sufficient number of female athletes in competitive sports were identified for selection of subjects. Sixty three subjects from a range of sports and different levels of participation were selected for the study. Mean age of subjects were 19 years. The random group design was used to randomly assign subjects to five different groups.

METHOD

All the five groups continued physical training for their respective sport under the guidance of their coaches. "Group 1'was trained in autogenic training "Group 2" in breathing exercises, "Group 4" in progressive muscle relaxation and "Group 5"in imagery. The treatment for each group was applied by the research scholar for a period of twelve weeks."Group 3" formed the control group and was not given any treatment.

STATISTICAL TOOLS

Competitive anxiety evaluated using modified CSAI-2 (Martens *et al,* 1990; Jones and Swain, 1992; Jones, *et al.,* 1993) and mood states examined on BRUMS (Terry, *et al.* 1999) of a previous optimum and dysfunctional performance using recall method formed referential criterion for observing changes post intervention. Data was analysed using paired t-test, analysis of variance and coefficient of correlation. Paired t-test was employed to verify any difference between the two pre tests. It was also be utilized to evaluate difference between post test and pre test optimum performance and between post test and pre test dysfunctional performance, on the variables selected for the study. Analysis of variance was used to compare effective changes on variables among intervention groups from pre test 2 to post test and from pre test 1 to post test. Coefficient of

correlation was worked out to assess relationship among pre competitive concomitants and performance measures.

RESULTS OF THE STUDY

The subcomponents of pre competitive anxiety between pre test optimum and pre test dysfunctional performances was compared using paired t- test. There were significant differences in somatic anxiety intensity, self confidence, and interpretation of cognitive anxiety and interpretation of somatic anxiety. There was no significant difference in cognitive anxiety intensity. Somatic anxiety intensity was significantly lower in optimum performance. Self confidence was significantly higher in optimum performance. Interpretation of cognitive anxiety, interpretation of somatic anxiety was significantly more facilitative in optimum performance. Similar cognitive anxiety intensity was detected in optimum and dysfunctional performances.

Comparing the pre competitive mood states between pre test optimum and pre test dysfunctional performances using paired t- test, showed significant differences in anger, confusion, depression, fatigue, tension and vigour. Anger, confusion, depression, fatigue, tension was significantly lower in optimum performance. Vigour was significantly higher in optimum performance.

Comparison of subcomponents of competitive anxiety between post test and pre test dysfunctional performance using paired t- test, detected significant differences in cognitive anxiety intensity, somatic anxiety intensity, self confidence, interpretation of cognitive anxiety and interpretation of somatic anxiety. Cognitive anxiety intensity and somatic anxiety intensity were significantly lower in post test. Self confidence was significantly higher in post test. Interpretation of cognitive anxiety and interpretation of somatic anxiety was significantly more facilitative post test.

Mood states between post test and pre test dysfunctional performance was compared using paired t- test. There were significant differences in anger, confusion, depression, fatigue, tension and vigour. Anger, confusion, depression,

fatigue, tension and were significantly lower in post test. Vigour was higher in post test.

Comparing subcomponents of competitive anxiety between post test and pre test optimum performance using paired t- test showed significant differences in cognitive anxiety intensity, somatic anxiety intensity and interpretation of cognitive and somatic anxiety. There was no significant difference in self confidence. Cognitive anxiety and somatic anxiety were lower in post test. Interpretation of cognitive anxiety and interpretation of somatic anxiety was less facilitative in post test. Similar self confidence was detected in post intervention test and optimum performance.

Paired t- test comparing mood states between post test and pre test optimum performance showed significant differences in anger and vigour. There was no significant difference in depression, fatigue, tension and confusion. Anger and vigour were higher in post test. Similar confusion, depression, fatigue and tension were detected in post test and optimum performances.

The changes effected with respect to interpretation of cognitive anxiety from dysfunctional performance to post test was compared among the five different groups. Analysis of variance (ANOVA) performed on the difference between dysfunctional performance and post test showed significant difference in breathing technique (*Pranayama*) group and imagery (Paradoxical imagery) groups for interpretation of cognitive anxiety. The mean effect for breathing group and imagery group were higher than autogenic, progressive muscle relaxation and control groups. There was no significant difference in autogenic, progressive muscle relaxation and control group for interpretation of cognitive anxiety. Moderate differences not detected among autogenic, progressive muscle relaxation and control group may be attributed to very high coefficient variance (234) detected among them.

A similar comparison of intervention groups in effecting changes with respect to interpretation of somatic anxiety from dysfunctional performance to post test using ANOVA performed on the difference between dysfunctional

performance and post test detected significant difference in breathing technique (*Pranayama*) group and imagery (Paradoxical imagery) groups for interpretation of somatic anxiety. The mean effect for breathing and imagery groups was higher than autogenic, progressive muscle relaxation and control groups. There was no significant difference in autogenic, progressive muscle relaxation and control group for interpretation of cognitive anxiety. Moderate differences not detected among autogenic, progressive muscle relaxation and control groups, may be attributed to very high coefficient of variance (377) detected among them.

Comparing intervention groups in effecting changes with respect to interpretation of cognitive anxiety from optimum performance to post test using ANOVA performed on the difference between optimum performance and post test found significant difference in breathing technique (*Pranayama*) group and imagery (Paradoxical imagery) groups for interpretation of cognitive anxiety. The mean effect for breathing group and imagery group were higher than autogenic, progressive muscle relaxation and control groups. There was no significant difference in autogenic, progressive muscle relaxation and control group for interpretation of cognitive anxiety interpretation of cognitive anxiety. Moderate differences not detected among autogenic, progressive muscle relaxation and control group may be attributed to very high coefficient variant (158) detected among them.

Similarly comparison of intervention groups in effecting changes with respect to interpretation of somatic anxiety from optimum performance to post test using ANOVA detected significant difference in breathing exercise group and imagery (Paradoxical imagery) groups for interpretation of somatic anxiety. The mean effect for breathing group and imagery group were higher than autogenic, progressive muscle relaxation and control groups. There was no significant difference for interpretation of cognitive anxiety in autogenic, progressive muscle relaxation and control group. Moderate differences not detected among autogenic, progressive muscle relaxation and control group may be attributed to very high coefficient variant (197) detected among them.

There was significant relationship between depression and other mood states. There was significant positive relationship for anger-depression; fatigue-depression; tension-depression and confusion-depression. There was significant negative relationship for vigour-depression.

Significant relationship was detected among negative mood states. There was significant positive relationship between fatigue–tension; fatigue-confusion; tension-confusion; tension-vigour; anger-confusion and fatigue-anger.

Significant negative relationship was found between depression and performance. No relationship was found between fatigue and performance; tension and performance; and vigour and performance.

No significant relationship was found for intensities or interpretation of cognitive and somatic anxiety or for self confidence with performance.

No significant relationship was found between pre competitive intensities of cognitive and somatic anxiety with any of the physiological parameters (heart rate, respiratory rate, systolic blood pressure and diastolic blood pressure.

No significant relationship was detected between pre competitive cognitive anxiety intensity and interpretation of cognitive anxiety and somatic anxiety intensity and interpretation of somatic anxiety.

There was significant positive correlation between self confidence and interpretation of cognitive anxiety. No significant relationship was found between self confidence and interpretation of somatic anxiety.

CONCLUSIONS

1. Findings exploring pre tests and correlations worked out for post test, suggest anxiety mood performance relationship to be a complex interaction between pre competitive anxiety and mood states.
2. Autogenic training, breathing exercise, progressive muscle relaxation and imagery were found to be equally effective in moderating pre competitive anxiety and mood states for optimum performance.

3. Breathing exercise and imagery (Paradoxical imagery) were found to be more effective in moderating directionality of interpretation of anxiety. However moderating directionality of interpretation of anxiety may need a longer intervention.

Present findings indicate that cognitive anxiety and somatic anxiety may have differential performance outcome based on the absence or presence of depression since significant positive correlation was detected between depression and cognitive anxiety and between somatic anxiety and depression in post test. Significant positive correlation was detected between post test depression and performance. Pre test dysfunctional performance of the present study detected with high scores of depression along with high cognitive and somatic anxiety and pre test optimum performance detected with lower scores of depression with similar cognitive anxiety but lower somatic anxiety add support to the influence of depression in deciding performance outcome. Significant relationship was not observed for any other pre competitive concomitants with performance.

The present study also finds support for conceptual model (Lane and Terry, 2000) which proposes that anger, confusion, fatigue and tension may have differential performance relationship based on the presence on absence of depression and that depressed mood acts as a catalyst for reduced perception of vigour thereby decreasing the facilitative influencing on performance. There was significant positive correlation between depression with anger, confusion, fatigue, tension and significant negative correlation between vigour and depression for post test of the present study. The significant positive correlation detected between post test anger and confusion, anger and fatigue, confusion and fatigue, tension and fatigue, tension and confusion, further accentuates the influence of depression on these mood factors. Pre test optimum performance detected with low scores on depression and a corresponding lower anger, confusion, fatigue, tension and higher vigour and pre test dysfunctional pre test detected with high scores on depression with a corresponding higher anger, confusion, fatigue, tension and lower vigour adds further support to the influence of depression upon performance.

Present study proposes the importance of regulating mood states with special emphasis on depression along with anxiety management for performance enhancement. Performance assessed using measure of player performance questionnaire post intervention, revealed eighty per cent of athletes were satisfied with their performance, thirteen per cent were not satisfied with their performance and five per cent reported outstanding performance satisfaction.

RECOMMENDATIONS

1. Steps should be taken to incorporate Psychological skill trainings in athletic preparation.
2. Mood regulation should be given due importance along with anxiety management while preparing an athlete.
3. Care should be taken to create congenial pre competition mood states that are free of depressive feelings.
4. Conducting evaluation of self talks leading to depressive feelings will be useful in understanding their antecedents.
5. Athletes should be made aware of negative effects of depression.
6. Pre competitive anxiety and mood states of athletes prior to replicate tournaments creating placebo competition effects during training period should be regularly evaluated that would serve as useful information to athletes to develop self awareness in order to regulate them.